

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-16 are pending in this application. Claims 1 and 6 are amended by the present amendment, and Claims 15 and 16 are added by the present amendment.

In the outstanding Office Action, Claims 1 and 6 were rejected under 35 U.S.C. § 103(a) as unpatentable over Chadwick et al., *Layered Construction for Deformable Animated Characters*, Computer Graphics, July 1989, at 243-252 (herein “Chadwick”) in view of Foley et al., Computer Graphics Principles and Practice: Second Edition in C, 471-531 (Addison-Wesley Publishing Co., 12th ed. 1999) (herein “Foley”). Claims 2 and 7 were rejected as unpatentable over Chadwick in view of Foley and Konno (U.S. Patent No. 6,198,979). Claims 3-5 and 8-10 were indicated as allowable if rewritten in independent form. Claims 11-14 were allowed.

Applicants thank the Examiner for the indication of allowable subject matter.

Claims 1 and 6 were rejected under 35 U.S.C. § 103(a) as unpatentable over Chadwick in view of Foley. That rejection is respectfully traversed.

Amended independent Claim 1 is directed to a method of generating a free-form surface model by a rounding operation that includes applying a linear transformation to a lattice polygon model to generate vertices of a free-form surface model corresponding to respective vertices of the lattice polygon model, and generating control points of cubic Bezier curves that connect the vertices of the free-form surface model and that correspond to respective edges of the lattice polygon model.

Amended independent Claim 6 is directed to a computer-readable memory medium having a program embodied therein for causing a computer to generate a free-form surface model by a rounding operation. The program includes program code units configured to

apply a linear transformation to a lattice polygon model to generate vertices of a free-form surface model corresponding to respective vertices of the lattice polygon model, and to generate control points of cubic Bezier curves that connect the vertices of the free-form surface model and that correspond to respective edges of the lattice polygon model.

In a non-limiting example, Figures 10 and 11 illustrate a construction method for a free-form surface model. A vertex-calculation unit 10 calculates vertices of the free-form surface model that corresponds to vertices of a lattice polygon model using a linear transformation of coordinates of the original vertices (see also the specification at page 11, lines 13-21). An edge-determination unit 20 determines edge geometries of the free-form surface model that correspond to edges of the lattice polygon model (see also the specification at page 11, line 22 to page 12, line 8). A free-form-surface-generation unit 30 interpolates Gregory free-form surfaces into the free-form surface model comprised of cubic Bezier curves (see also the specification at page 12, lines 9-15). The free-form surface model has the same topology as the original lattice polygon model, thereby allowing reconstruction of the original lattice polygon model (see also the specification at page 12, line 14 to page 13, line 16).

The claimed invention allows conversion between a lattice polygon model and a free-form-surface model, and provides a method that allows conversion from a lattice polygon model into a free-form-surface model and inverse conversion from the free-form-surface model into the lattice polygon model. Further, applicants submit that the lattice model is a shape that defines a free form-surface model, and the method of the claimed invention allows computing a free-form-surface model directly from a lattice model. As a result, the free-form-surface model can be deformed by deforming the lattice model. Because of the nature of the computation, inverse computation is possible that obtains the lattice model from the free form-surface model.

Chadwick does not teach or suggest an object to be deformed that is comprised of a lattice. Further, Chadwick does not teach or suggest generating a free-form-surface model by applying linear transformation to the object that is comprised of a lattice. Instead, Chadwick discloses generating the movement of human muscle and fatty tissue for computer animation by use of the FFDs (Free Form Deformations) (page 245, right column, lines 18-20; and page 246, right column, lines 19-20).

The outstanding Office Action at page 4, lines 1-14 equates a three-dimensional lattice and a computation of vertex positions through substitution of parametric weights into a blending function, as taught by Chadwick, to a lattice polygon model and a linear transformation, respectively, of the claimed invention. However, unlike the claims in which an object to be deformed is comprised of a lattice, Chadwick discloses general FFD techniques, which deform a cube by operating control points constituting a three-dimensional lattice, thereby deforming an object enclosed in the cube.

Further, the three-dimensional lattice referred to by Chadwick is merely a Bezier volume which is comprised of 64 control points and generated from an object to be deformed (page 247, left column, lines 5-6). Operating these control points allows the three-dimensional lattice to be deformed, thereby deforming the corresponding object (page 247, left column, lines 16-18; and page 248, right column, lines 10-12). Thus, Chadwick does not teach or suggest generating a free-form-surface model by applying linear transformation to the object that is comprised of a lattice.

Additionally, Chadwick discloses that the substitution of parametric weights into a blending function results in the vertex positions being obtained (page 247, left column, lines 18-22). Applicants note that this merely indicates that it is possible to represent the vertex positions by the parametric weights. In particular, the substitution of parametric weights of

vertexes into a tricubic Bezier hyperpatch formula results in the position of the vertexes being obtained.

Foley does not overcome the above-noted deficiencies of Chadwick. In fact, Foley does not even mention an object to be deformed that is comprised of a lattice nor generating a free-form-surface model by applying linear transformation to the object that is comprised of a lattice.

Accordingly, it is respectfully requested that this rejection be withdrawn.

Claims 2 and 7 were rejected under 35 U.S.C. § 103(a) as unpatentable over Chadwick in view of Foley and Konno. That rejection is respectfully traversed.

Dependent Claims 2 and 7 depend from and include all of the limitations of independent Claims 1 and 6, respectively. Konno does not overcome the above-noted deficiencies of Chadwick and Foley. Accordingly, it is respectfully requested that this rejection also be withdrawn for similar reasons as discussed above.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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